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(73) Proprietor: **THE WHITAKER CORPORATION**
4550 New Linden Hill Road,
Suite 450
Wilmington, Delaware 19808 (US)

(72) Inventor: **Broeksteeg, Johannes Marcelus**
Hertogensingel 62
NL-5341 AG Oss (NL)

(74) Representative: **Warren, Keith Stanley et al**
BARON & WARREN
18 South End
Kensington
London W8 5BU (GB)

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Description

The present invention relates to an electrical connector assembly for printed circuit boards and more particularly to a high speed impedance matched backplane connector.

In current electronic circuits, the use of increasingly higher speed switching signals has necessitated control of impedance for signal transmission. In an attempt to provide an impedance matched connector, a coaxial type connector as described in U.S. Patent 4,451,107, was devised. Although some of the above mentioned problems were solved, other serious problems arose. At high speed transmission, the right angle of the terminals causes reflection of the signals limiting the effectiveness of the connector at high speed transmission.

The manufacturing of the connector described in U.S. Patent 4,451,107 is also made impractical by the manufacturing process of die casting the metal housing, injection molding of nylon sleeve, casting the terminals through the nylon sleeves in the housing. This process of manufacturing is very difficult to control and can lead to faulty connections. Therefore, the configuration of the invention of the above cited reference is impractical for many reasons.

In another attempt to design an impedance control connector, as shown in EP-A-0 273 589, a mother-daughter board connector is disclosed and shows a motherboard connector 10 and a right angle connector or plug connector 8 which is interconnectable to the motherboard 10. The motherboard 10 includes a plurality of tab assemblies 20. A right angled connector 8 includes insulative housing 22 having a plurality of apertures 12 therethrough. In order to control the impedance of the terminals in a right angled connector, since the signal path distances must differ, a dielectric coil spring 56 or dielectric member 49 is placed over the terminals 18. The selection of the material and configuration of the coil springs 56 and dielectric 49 can alter the speed at which the signals propagate through the terminals. Since the lengths of the terminals vary, the dielectric constant for the shorter terminals is higher, slowing the signals down somewhat, whereas the longer terminals have a lower dielectric constant to increase the speed of the signal relative to the shorter signals. While in theory the above-mentioned design accomplishes the desirability of matching the impedance between the right angled terminals, the connector is somewhat complicated and thereby difficult and costly to manufacture.

The present invention consists in a right angled electrical connector comprising an insulating housing having pin receiving apertures in a front mating face thereof for receiving mating pins of a mating connector, said pin receiving apertures being in communication with pin receiving passageways extending to a rear face of the housing, and said apertures and passageways being arranged in an array of columns and rows, and electrical terminal members having contact portions positioned in the pin receiving passageways, terminal sections for connection to a printed circuit board and intermediate portions interconnecting the contact portions and terminal sections, characterised in that the electrical terminal members are arranged in a plurality of terminal subassemblies, each of which comprises a column of electrical terminal members for alignment with one of the columns of passageways of the insulating housing encapsulated within a molded insulating web, each terminal subassembly having the contact portions of the terminal members projecting forwardly from the insulating web and the terminal sections projecting therefrom at right angles to the contact portions, and further characterised in that the terminal subassemblies are positioned against the insulating housing in juxtaposed relation with the contact portions of the terminal members supported within the pin receiving passageways and the intermediate portions and terminal sections supported by the insulating web.

It is important to provide for an easily manufactured right angled connector with the availability for other options, such as, exterior RFI/EMI shielding, keying and the like, without complicating the system. This invention is able to provide a shielded and impedance matched electrical connector which is easily manufacturable. It also enables the provision of optional exterior shielding and optional shielding between the contacts to prevent crosstalk.

Hence, by suitable design, the connector according to the invention can accommodate a plurality of applications and configurations. It can be used in an unshielded configuration, a fully shielded (EMI/RFI) configuration, and a fully shielded configuration and include shield members between each vertical column of electrical terminal members to prevent crosstalk between adjacent terminals in adjacent vertical columns.

Embodiments of the present invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a right angled daughterboard connector according to the invention;

Figure 2 is an enlarged view of two of the housing modules of the daughterboard connector shown in Figure 1;

Figure 3 is a cross-sectional view through the daughterboard connector of Figures 1 and 2 poised for interconnection with the post header;

Figure 4 is similar to Figure 3 showing the daughterboard connector and post header in a mated configuration;

Figure 5 is a plan view of the stamped blank of the terminal subassembly;

Figure 6 is a view similar to that of Figure 5 show-

ing the molded web over the terminal lead frame;

Figure 7 is an end view of the subassembly of Figure 6;

Figure 8 is a view of the completed terminal subassembly;

Figure 9 is a rear view of the connector housing;

Figure 9A is a rear fragmentary view showing the terminal subassembly inserted within the rear face of the housing module;

Figure 10 is a isometric view of the post header;

Figure 11 is an alternative embodiment of the invention;

Figure 12 is an isometric view showing an embodiment of the invention with the cross talk shield members in position for insertion;

Figure 13 is a plan view of the cross talk shield of Figure 14 with one terminal subassembly in phantom;

Figure 13A is a front plan view of Figure 13;

Figure 13B is a rear fragmentary view showing the terminal subassembly and cross talk shield of Figure 13 inserted in a rear housing module;

Figure 14 is a further alternative embodiment of a fully shielded and enclosed daughterboard connector assembly;

Figure 15 is yet a further embodiment;

Figure 16 is a right angled post header for use with the embodiment of Figure 15;

Figure 17 is a rear isometric view of the portion of the connector shown in Figure 16.

With reference first to Figures 1 and 10, the invention includes a daughterboard connection system 2 which is interconnectable with a post header such as that shown in Figure 10. The electrical connection system 2 of the present invention includes a plurality of housing modules 4 abutted one against the other to form the connection system. It should be understood that while only two such modules are shown in Figure 1, this is for clarity only. Any number of modules can be used and it is anticipated that a typical connection system would include 8-10 modules.

With reference now to Figure 2, each of the modules 4 includes a front mating face 6 having a plurality of pin receiving passageways 16, a top wall 8, a bottom wall 10, sidewalls 12, and a rearwall 14. With reference to Figure 3, the pin receiving passageways 16 include narrow apertures 18 in the front mating face 6. Lower passageways 15 are provided for receiving ground pins.

With reference to Figure 9, which is a rear view of the housing member 4, the cross sectional configuration of each passageway 15 is shown in greater detail. Each passageway 15 includes two vertical slots 20 and 22 where the first vertical slot 20 is symmetrical with the center of the narrow aperture 18 whereas the second vertical slot 22 is flush with the right hand (as shown in Figure 9) sidewall 17. It should be noted that the passageway 15, as defined by the sidewalls 17, 19, is asymmetrical with the center line of the narrow aperture 18, the reason for which will be explained hereafter. The passageways 16 include vertical slots 20' and to the right of these passageways are slots 22' which are vertically aligned with the vertical slots 22.

With reference again to Figure 2, just below the topwall 8 is located an elongate slot 24, which is defined by an upper surface 25, a lower surface 26 and sidewall surfaces 30. The upper surface 25 has a plurality of slots 34 therein for the receipt of keying members 274, and the lower surface 26 includes two raised sections 28, which will be described more fully hereafter.

The terminal subassembly 60 shown in Figure 8 is manufactured by stamping a terminal lead frame 62, as shown in Figure 6, having a plurality of individual terminal members 64,65,66 and 67. It should be noted that while the preferred embodiment is for use with four terminals, that is 64-67, an extra terminal 67' commoned with terminal 67 is available. The terminals 64-67 include stamped contact portions 68,69,70 and 71. They also include intermediate portions 72,73,74 and 75 which interconnect the contact portions 68-71 to compliant terminal or pin sections 76-79 respectively.

Once the terminal lead frame is stamped, a web of insulating material 82 (Figure 6) is molded over the terminal lead frame 62 such that one leg 82a spans and integrally retains at least a portion 72a,73a,74a and 75a of each of the intermediate portions. Items 72a-75a will be referred to as that section of the intermediate portions 72-75 which is integrally molded within the web 82. The molded web 82 also includes a leg 82b which is molded at a 90° angle relative to leg 82a and spans and integrally holds the plurality of terminals adjacent to the compliant pin sections 76-79. After the molding step, the terminals can be finished by having the terminal contact portions 68-71 formed into opposing contacts by twisting the contact arms about their lengths. The terminals can also be severed from their carrier strips to form discrete terminals. If only four terminals are required, then the lead frame will be severed at the dashed line 85 (Figure 5) whereas the lead frame will be severed at the dashed line 87 if the extra contact is required.

By molding the legs 82a and 82b over sections of the terminals, a window or opening 82c is formed over the terminal intermediate portions 72-75, which are not integrally molded in the web 82. It should be noticed first that the intermediate portions 72-75 are not equal in length, which is typical of any right angle connector. However, the configuration of the stamped terminals is an attempt to equal the length of the terminals. For example, intermediate portion 72 has two bends which are approximately 45° angles, whereas the portion 75 has an intermediate bend, which projects the terminal downwardly which tends to length-

en the terminal. Thus the shape of the intermediate portion 72 tends to keep the propagation velocity high, whereas the shape of the portion 75 slows the propagation velocity; the end result of which is less time delay between the terminals. Thus, if the signal speed is equal in all of the terminals 64-67, a reflection would occur, and there would be a lag in the pulse signals in any two of the terminals 64-67, which could lead to a faulty switching signal, if two of the signals are being used in the same switching device.

To avoid the faulty signal switching, the terminals in the above embodiment have equal impedance, or are "impedance matched". In the electrical connector of the instant embodiment, the configuration of the molded web 82 has been designed to impedance match all of the electrical terminals.

It should be noticed that the lengths of the terminal sections 72a-75a, which are the section of the intermediate portions within the dielectric material, (Figure 8) are of different lengths. For example, terminal section 75a has the longest length whereas terminal section 72a is the shortest. Conversely, those sections of the intermediate portions which are not within the molded web, that is, 72b,73b,74b and 75b, and are open to the air medium, are inversely proportions to their respective sections 72a-75a. In other words, to look at the extremes, terminal 64 which is the longest of the terminals has the shortest section 72a encapsulated within the dielectric and yet the longest section 72b which is within the air medium.

Terminal 67, however, which is the shortest of the terminals, has the longest section 75a which is encapsulated within the dielectric and the shortest section 75b which is within the air medium. Thus, the impedance of terminal section 75a is greater than that of terminal section 72a. Terminal section 72b has an impedance which is different from terminal section 75b, due, primarily to its length. Since the air medium has a dielectric constant of 1.0 whereas the dielectric constant of the dielectric is much higher, on the order of 3.2, the increase in the length of the section 75a even a small distance, has a large effect on the overall impedance of that terminal, which also has a direct effect on the propagation velocity. Therefore, the impedance of the terminals 64-67 can be matched by controlling the lengths of the terminals in the various mediums, in this case within the dielectric and air.

It should also be noticed that the molded web 82 gives a generally rectangular shape having an upper horizontal surface 82d, a rear perpendicular surface 82e, a lower horizontal surface 82f and a forward perpendicular edge 82g.

With reference now to Figure 1, the shield member 100 is shown as including an upper plate portion 102 having integral and resilient fingers 104 stamped and formed from the plate portion 102. It should be noticed that between each pair of fingers 104 is defined a slot 108. The shield member 100 further includes a rearwall 110 and a foot portion 112. Stamped from the rear wall, is a plurality of tab members 114 having apertures 116 therethrough.

To assemble the connector assembly, the plurality of terminal subassemblies 60 are inserted into the rear of the housing modules 4 such that the terminal subassemblies are each stacked one against the other as shown in Figures 1 and 2. The subassemblies 60, when stacked together, ensure that the blade sections 72c, 73c, 74c and 75c, are aligned with the vertical slots 20' which dispose the plurality of opposed contact portions 68-71 adjacent to the narrow aperture 18 at the front mating face of the connector. The terminal subassemblies 60 are inserted into the connector housing modules 4 until the front leading edge 82g of the molded web 82 abuts the rear face 14 of the connector housing module 4, as shown in Figure 3. Due to the molded rear edge 82e the subassemblies 60 are easily inserted from the rear using conventional insertion tooling.

It should be noted from Figure 7, that the centerline of the terminal lead frame is disposed off center relative to the molded web. However, when the terminal subassemblies are inserted into the housing 4, the opposed contact portions 68-71 are aligned with the narrow apertures 18. These inserts or subassemblies 60 are used when crosstalk shielding between adjacent vertical rows of contacts is not necessary. In this application, the stackup thickness of the webs 82 aligns the terminals with the corresponding apertures.

In the event that crosstalk shielding is desired, then individual crosstalk shield members are available which are insertable between adjacent vertical columns of terminals. As shown in Figures 12 and 13, cross talk shield members 180 are used in conjunction with terminal subassemblies 60', and are similarly placed within the housing modules.

As shown in Figure 13, the shield member 180 includes a planar section 182 having a shielding plate 184 extending therefrom. A fifth contact member 185 is also included which is electrically connected to the ground member 180 and has a staggered section 186 and opposed contact portions 188. Another staggered section 190 is included which has a compliant section 192 extending therefrom.

When the cross talk shield 180 is used, a different terminal subassembly is also used, and is designated as 60'. However, the only difference between the molded webs 82 and 80' is the difference in their thickness. As shown in Figure 13B, the thickness of web 80' is less than that of web 82, by the thickness of the crosstalk shield member 180. Said differently, the sum of the thickness of the molded web 80'and the crosstalk shield member 180 is equal to the thickness of the molded web 82.

When cross-talk shielding is used, the cross-talk shield 180 is inserted first, and then the terminal sub-

assembly 60' is inserted into the housing module 4, the opposed contact portions still align with the narrow apertures 18, as the left justification has not changed. When the crosstalk shield member 180 is inserted into the module 4, the plate portion 184 of the shield member 180 resides within the respective vertical slot 22'. At the lower horizontal row of contacts, the opposed contact portions 188 of shield 180 are stepped over, via the portions 186, to align the opposed contacts 188 with the lower horizontal row of apertures 18. This allows the extra row of posts 266 (Figure 10) to be used to ground the individual crosstalk shield members.

With the individual connector modules 4 assembled with terminal subassemblies 60, the housing modules and terminals can be inserted on a printed circuit board 200' such that the compliant pin sections 76-79 are inserted into the mating through holes 202', as shown in Figure 12. It should be noticed that the section 190 also staggers the compliant pin 192 to the left to align it with the ground trace 204' on the printed circuit board 200'.

With the connector modules so installed on a printed circuit board the shield and mechanical stiffener 100 may be assembled to the array of connector modules 4. The shield member 100 is inserted from the rear side of the connector assembly as shown in Figures 1, 12 or 14, such that the resilient fingers 104 of the shield are disposed between the inner surfaces 30 in the individual connector housing modules 4. One upper shield member 100 would be used for the plurality of individual connector modules with two resilient fingers 104 dedicated to each connector module 4. As assembled, the fingers 104 flank the outside of the sections 28 and the slots 108 between the adjacent finger members 104 span the thin wall sections 32 of adjacent housing modules. One lower shield member 100' is also used as shown in Figure 4 having resilient fingers 104'.

With reference now to Figure 10, a backplane 230 is shown as including a plurality of through hole portions 232 in the backplane 230 with a plurality of post headers 260 stacked end to end electrically interconnected to the through hole portions 232. Each of the post headers 260 includes a housing 240 having a lower face 244 with the plurality of post through holes 242 therethrough. The post housing 240 further includes two sidewalls 246 and 248 where one of the sidewalls 246 includes slots 250. The post headers 260 further include a plurality of posts where the posts 262 are designated as the signal contacts, post 266 is an extra contact for use with either the extra contact 71' (Figure 5), or with the crosstalk shield contacts 185 or 185' (Figures 12 and 14) and posts 270 are provided as an array of shielding members to shield the signal contacts from EMI/RFI.

When the shielded connector assembly 2 is to be interconnected to the post headers as shown in Figure 4, the connector housing modules 4 and the post header housings 240 can be keyed together to form a unique polarized interconnection system. For example, in the configuration shown in Figure 10, the assembly is shown as including seven post headers 260 assembled to the motherboard 230. In the first of the post headers 260 on the motherboard 230, the first two slots 250 are left blank while the last two slots include polarizing lugs 274. In the second post housing the first two slots 250 include two polarizing lugs 274 while the last two slots are left free. To key the housing modules 4 to mate with the first of the two tab housings shown in Figure 1, in the first housing module 4 the first two slots 34 would include keyed members 274 while in the second module 4 the last two slots would include keying lugs 274. Therefore, when the shielded subassembly 2 as shown in Figure 1 is interconnected to the plurality of post headers as shown in Figure 10, the first two keying lugs 274 in the first housing module 4 would pass within the first two slots 250 in the first tab header while the keying lugs 274 in the last two slots 250 would pass within these slots 34 in the first housing module 4.

The preferred method for assembling the connector system is to have the aperture 24 (Figure 2) on the bottom as shown best in Figure 12. This provides that the upper shield member 100 can be placed straight down onto the top of the connector assembly. In the event that a plurality of components are placed on the board, there may not be enough room for the shield member 100 to be slid into place from the rear. Shield member 100' should be able to be slid into place as the underside of the board 230 should be clear.

This polarizing scheme would be carried out throughout the assembly to provide any multiple of keyed systems. It should also be noticed that when the shielded interconnection system 2 is interconnected to the plurality of poster headers as shown in Figure 4, the wall 246 is within the opening 24 of the individual housing modules. Each of the post header housings 240 includes a recessed section 252 at both ends of the wall 246, when the tab housings are abutted one to the other a slot 254 is formed which allows the adjacent walls 32 of the modules 4 to pass therein. It should also be noticed that when in this position, the two fingers 104 are interconnected to the ground posts 270 which are in the corner positions only. The remainder of the contacts 270 intermediate the corner posts do not contact the shield member 102 but only act as shielding for the interior signal contacts.

Figure 14 is an alternative embodiment of any of the previous connector systems where the entire connector assembly is shielded.

Figure 15 is an alternative embodiment shown the possibility for further expansions to the system, where another post header is added to the daughter board and can accept a further daughterboard connector therein.

Figure 16 is an isometric view of the tab header for use in the connection system of Figure 15.

Figure 17 is a rear view of that portion of the connector assembly of the Figure 16.

Claims

1. A right angled electrical connector (2) comprising an insulating housing (4) having pin receiving apertures (18) in a front mating face (6) thereof for receiving mating pins of a mating connector, said pin receiving apertures (18) being in communication with pin receiving passageways extending to a rear face (14) of the housing, and said apertures and passageways being arranged in an array of columns and rows, and electrical terminal members (64-67) having contact portions (68-71) positioned in the pin receiving passageways, terminal sections (76-79) for connection to a printed circuit board (200) and intermediate portions interconnecting the contact portions and terminal sections, characterised in that the electrical terminal members (64-67) are arranged in a plurality of terminal subassemblies (60), each of which comprises a column of electrical terminal members (64-67) for alignment with one of the columns of passageways of the insulating housing encapsulated within a molded insulating web (82), each terminal subassembly having the contact portions (68-71) of the terminal members projecting forwardly from the insulating web and the terminal sections (76-79) projecting therefrom at right angles to the contact portions, and further characterised in that the terminal subassemblies (60) are positioned against the insulating housing (4) in juxtaposed relation with the contact portions (68-71) of the terminal members (64-67) supported within the pin receiving passageways and the intermediate portions (72-75) and terminal sections (76-79) supported by the insulating web (82).

2. A connector according to claim 1, characterised in that the insulating webs (82) are juxtaposed in abutting members (64-67) and align the contact portions (68-71) with the pin receiving passageways.

3. A connector according to claim 1, characterised in that shield members (180) are positioned between the insulating webs (82) to prevent crosstalk between adjacent columns of terminals.

4. A connector according to claim 3, characterised in that the terminal subassemblies (60) and the shield members (180) are dimensioned to stack one against the other to align the contact portions (68-71) with the pin receiving passageways.

5. A connector according to any preceding claim, characterised in that the insulating webs (82) have front edges (82g) substantially perpendicular to the pin receiving passageways.

6. A connector according to claim 5, characterised in that the webs (82) have lower edges (82f) spaced above a lower row of pin receiving passageways.

7. A connector according to claim 6, characterised in that the terminal sections (76-79) do not extend to the plane defined by a bottom wall (10) of the housing (4).

8. A connector according to any preceding claim, characterised in that an upper shield (100) is positioned over the housing (4) and over the terminal subassemblies (60).

9. A connector according to claim 8, characterised in that the upper shield (100) has at least one foot portion (112) extending from the shield for contacting the printed circuit board (200).

10. A connector according to claim 8 or 9, characterised in that the upper shield (100) is positioned adjacent to the front mating face (6) of the housing.

11. A connector according to claim 8, 9 or 10, characterised in that a lower shield (100') is attached to the housing module (4) and is positioned below the terminal subassemblies (60).

12. A connector according to any preceding claim, characterised in that the intermediate portions (72-75) extend at a predetermined angle between the printed circuit board terminal sections (76-79) with the contact portions (68-71).

13. A connector according to any preceding claim, characterised in that each insulating web (82) includes a leg (82a) which spans the intermediate portions (72-75) adjacent to the contact portions (68-71).

14. A connector according to claim 13, characterised in that the lengths of the intermediate portions (72-75) encapsulated within the leg (82a) vary with the terminal members (64-67).

15. A connector according to any preceding claim, characterised in that each insulating web (82) includes a leg (82b) which spans the intermediate portions (72-75) adjacent to the terminal sections

(76-79).

16. A connector according to any preceding claim, characterised in that the configurations of the insulating webs (82) are designed to impedance match the terminal members.

17. A connector according to claim 16, characterised in that the insulating webs (82) include openings (82c) therein, which provide air adjacent to the terminal intermediate portions (72b,73b,74b,75b).

Patentansprüche

1. Rechtwinkliger elektrischer Verbinder (2), mit einem isolierenden Gehäuse (4) mit Stiftaufnahmeöffnungen (18) in einer vorderen Kontaktseite (6) des Gehäuses zur Aufnahme von Kontaktstiften eines Kontaktverbinders, wobei die Stiftaufnahmeöffnungen (18) in Verbindung mit Stiftaufnahmedurchgängen stehen, die sich zu einer Rückseite (14) des Gehäuses erstrecken, und wobei die Öffnungen und die Durchgänge in einer Gruppe von Spalten und Reihen angeordnet sind, und mit elektrischen Anschlußgliedern (64 bis 67) mit Kontaktabschnitten (68 bis 71), die in den Stiftaufnahmedurchgängen angeordnet sind, mit Anschlußabschnitten (76 bis 79) zur Verbindung mit einer gedruckten Schaltungskarte (200) und mit Zwischenabschnitten, die die Kontaktabschnitte und die Anschlußabschnitte verbinden, **dadurch gekennzeichnet**, daß die elektrischen Anschlußglieder (64 bis 67) in einer Vielzahl von Anschlußuntergruppen (60) angeordnet sind, wobei jede davon eine Spalte elektrischer Anschlußglieder (64 bis 67) zur Ausrichtung mit einer der Spalten der Durchgänge des isolierenden Gehäuses hat, die innerhalb einer geformten isolierenden Rippe (82) eingeschlossen sind, wobei jede Anschlußuntergruppe die Kontaktabschnitte (68 bis 71) der Anschlußglieder von der isolierenden Rippe nach vorne ragen läßt und die Anschlußabschnitte (76 bis 79) davon unter rechten Winkeln zu den Kontaktabschnitten vorragen läßt, und weiterhin dadurch gekennzeichnet, daß die Anschlußuntergruppen (60) gegen das isolierende Gehäuse (4) in nebeneinanderliegender Stellung angeordnet sind, wobei die Kontaktabschnitte (68 bis 71) der Anschlußglieder (64 bis 67) in den Stiftaufnahmedurchgängen getragen werden und die Zwischenabschnitte (72 bis 75) und die Anschlußabschnitte (76 bis 79) von der isolierenden Rippe (82) getragen werden.

2. Verbinder nach Anspruch 1, **dadurch gekennzeichnet**, daß die isolierenden Rippen (82) in Anschlaggliedern (64 bis 67) nebeneinander angeordnet sind und die Kontaktabschnitte (68 bis 71) mit den Stiftaufnahmedurchgängen fluchten.

3. Verbinder nach Anspruch 1, **dadurch gekennzeichnet**, daß Abschirmungselemente (180) zwischen den isolierenden Rippen (82) angeordnet sind, um ein Übersprechen zwischen benachbarten Spalten der Anschlüsse zu verhindern.

4. Verbinder nach Anspruch 3, **dadurch gekennzeichnet**, daß die Anschlußuntergruppen (60) und die Abschirmungselemente (180) so dimensioniert sind, daß sie einer gegen den anderen geschichtet sind, um die Kontaktabschnitte (68 bis 71) mit den Stiftaufnahmedurchgängen zu fluchten.

5. Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß die isolierenden Rippen (82) Vorderkanten (82g) haben, die im wesentlichen senkrecht zu den Stiftaufnahmedurchgängen angeordnet sind.

6. Verbinder nach Anspruch 5, **dadurch gekennzeichnet**, daß die Rippen (82) untere Kanten (82f) aufweisen, die im Abstand über einer unteren Reihe von Stiftaufnahmedurchgängen liegen.

7. Verbinder nach Anspruch 6, **dadurch gekennzeichnet**, daß die Anschlußabschnitte (76 bis 79) sich nicht bis zu der Ebene erstrecken, die durch eine Bodenwand (10) des Gehäuses (4) definiert ist.

8. Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß über dem Gehäuse (4) und über den Anschlußuntergruppen (60) eine obere Abschirmung (100) angeordnet ist.

9. Verbinder nach Anspruch 8, **dadurch gekennzeichnet**, daß die obere Abschirmung (100) wenigstens einen Fußabschnitt (112) hat, der sich von der Abschirmung zum Kontakt mit der gedruckten Schaltungskarte (200) erstreckt.

10. Verbinder nach Anspruch 8 oder 9, **dadurch gekennzeichnet**, daß die obere Abschirmung (100) in der Nähe der vorderen Kontaktseite (6) des Gehäuses angeordnet ist.

11. Verbinder nach Anspruch 8, 9 oder 10, **dadurch gekennzeichnet**, daß eine untere Abschirmung (100') am Gehäusemodul (4) angeordnet ist und unterhalb der Anschlußuntergruppen (60) positioniert ist.

12. Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß sich die Zwischenabschnitte (72 bis 75) unter einem vorbestimmten Winkel zwischen den Anschlußabschnitten für die gedruckte Schaltungskarte (76 bis 79) und den Kontaktabschnitten (68 bis 71) erstrecken.

13. Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß jede isolierende Rippe (82) einen Fuß (82a) hat, der die Zwischenabschnitte (72 bis 75) in der Nähe der Kontaktabschnitte (68 bis 71) überbrückt.

14. Verbinder nach Anspruch 13, **dadurch gekennzeichnet**, daß die Längen der Zwischenabschnitte (72 bis 75), die innerhalb des Fußes (82a) eingeschlossen sind, sich mit den Anschlußgliedern (64 bis 67) verändern.

15. Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß jede isolierende Rippe (82) einen Fuß (82b) aufweist, der die Zwischenabschnitte (72 bis 75) in der Nähe der Anschlußabschnitte (76 bis 79) überbrückt.

16. Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß die Formen der isolierenden Rippen (82) gestaltet sind, um die Anschlußglieder impedanzmäßig anzupassen.

17. Verbinder nach Anspruch 16, **dadurch gekennzeichnet**, daß die isolierenden Rippen (82) Öffnungen (82c) haben, die in der Nähe der Anschlußzwischenabschnitte (72b, 73b, 74b, 75b) Luft bereitstellen.

Revendications

1. Un connecteur électrique coudé à angle droit (2) comprenant un boîtier isolant (4) ayant des ouvertures de réception de broches (18) dans une face d'accouplement avant (6) du boîtier, pour recevoir des broches complémentaires d'un connecteur complémentaire, ces ouvertures de réception de broches (18) étant en communication avec des passages de réception de broches qui s'étendent vers une face arrière (14) du boîtier, et ces ouvertures et passages étant disposés en un réseau de colonnes et de rangées, et des éléments de bornes électriques (64-67) ayant des parties de contact (68-71) positionnées dans les passages de réception de broches, des sections de bornes (76-79) destinées à être connectées à une carte de circuit imprimé (200) et des parties intermédiaires interconnectant les parties de contact et les sections de bornes, caractérisé en ce que les éléments de bornes électriques (64-67) sont disposés en un ensemble de sous-ensembles de bornes (60), chacun d'eux comprenant une colonne d'éléments de bornes électriques (64-67) destinée à venir en alignement avec l'une des colonnes de passages du boîtier isolant, ces éléments de bornes électriques étant encapsulés à l'intérieur d'une plaquette isolante moulée (82), et chaque sous-ensemble de bornes ayant les parties de contact (68-71) des éléments de bornes qui s'étendent vers l'avant à partir de la plaquette isolante et les sections de bornes (76-79) qui s'étendent à partir de la plaquette perpendiculairement aux parties de contact, et caractérisé en outre en ce que les sous-ensembles de bornes (60) sont positionnés contre le boîtier isolant (4) dans une relation de juxtaposition avec les parties de contact (68-71) des éléments de bornes (64-67) qui sont supportés à l'intérieur des passages de réception de broches, et les parties intermédiaires (72-75) et les sections de bornes (76-79) supportées par la plaquette isolante (82).

2. Un connecteur selon la revendication 1, caractérisé en ce que les plaquettes isolantes (82) sont juxtaposées dans des éléments accolés (64-67) et elles alignent les parties de contact (68-71) avec les passages de réception de broches.

3. Un connecteur selon la revendication 1, caractérisé en ce que des éléments de blindage (180) sont positionnés entre les plaquettes isolantes (82) pour empêcher la diaphonie entre des colonnes adjacentes de bornes.

4. Un connecteur selon la revendication 3, caractérisé en ce que les sous-ensembles de bornes (60) et les éléments de blindage (180) sont dimensionnés de façon à se juxtaposer les uns contre les autres pour aligner les parties de contact (68-71) avec les passages de réception de broches.

5. Un connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que les plaquettes isolantes (82) ont des bords avant (82g) pratiquement perpendiculaires aux passages de réception de broches.

6. Un connecteur selon la revendication 5, caractérisé en ce que les plaquettes (82) ont des bords inférieurs (82f) espacés au-dessus d'une rangée inférieure de passages de réception de broches.

7. Un connecteur selon la revendication 6, caracté-

risé en ce que les sections de bornes (76-79) ne s'étendent pas jusqu'au plan qui est défini par la paroi inférieure (10) du boîtier (4).

8. Un connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce qu'un blindage supérieur (100) est positionné au-dessus du boîtier (4) et au-dessus des sous-ensembles de bornes (60).

9. Un connecteur selon la revendication 8, caractérisé en ce que le blindage supérieur (100) a au moins une partie de pied (112) qui s'étend à partir du blindage pour venir en contact avec la carte de circuit imprimé (200).

10. Un connecteur selon la revendication 8 ou 9, caractérisé en ce que le blindage supérieur (100) est placé dans une position adjacente à la face d'accouplement (6) du boîtier.

11. Un connecteur selon la revendication 8, 9 ou 10, caractérisé en ce qu'un blindage inférieur (100') est fixé au module de boîtier (4) et est placé au-dessous des sous-ensembles de bornes (60).

12. Un connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que les parties intermédiaires (72-75) s'étendent sous un angle prédéterminé entre les sections de bornes (76-79) de la carte de circuit imprimé et les parties de contact (68-71).

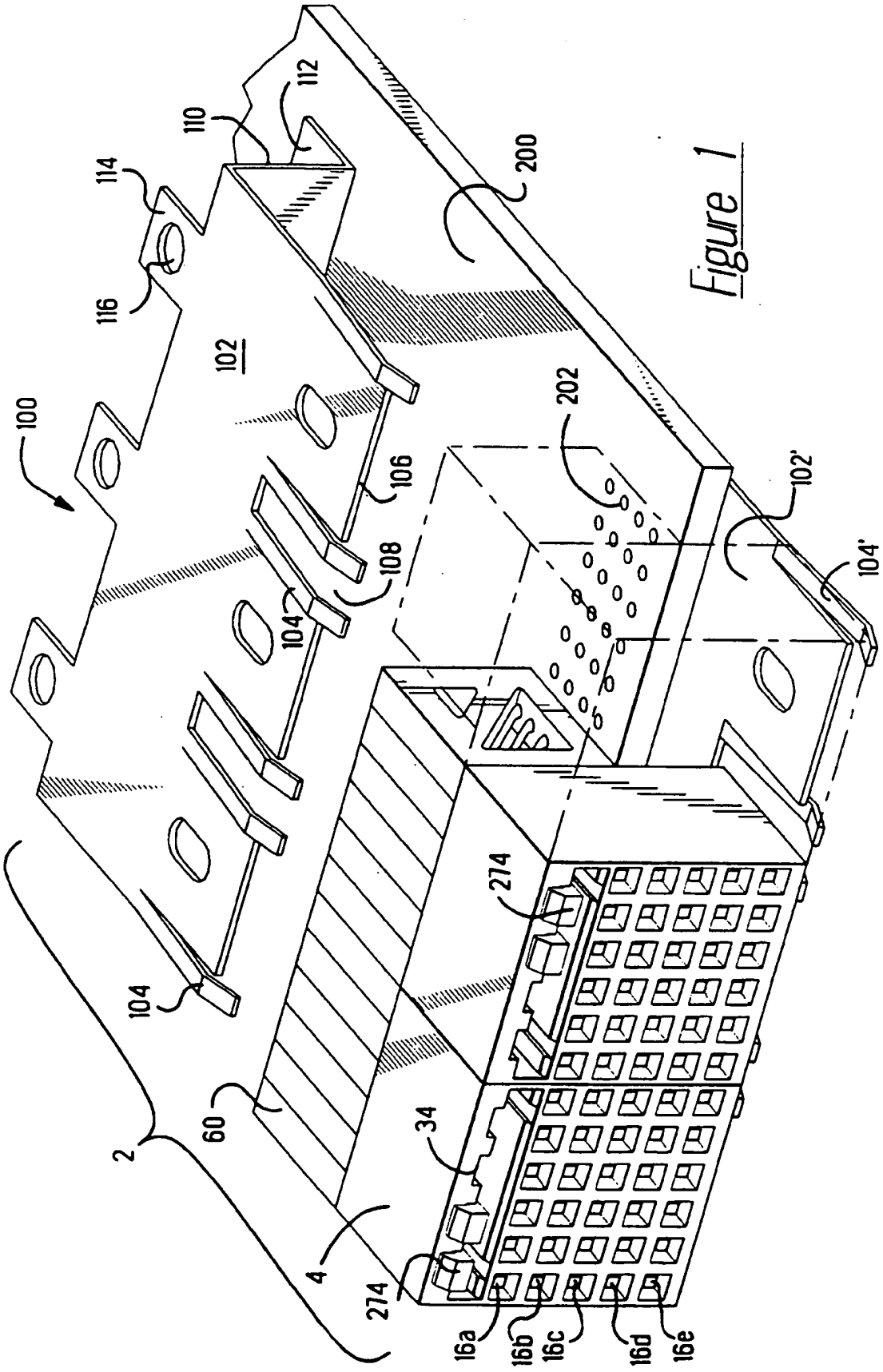
13. Un connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque plaquette isolante (82) comprend une branche (82a) qui couvre les parties intermédiaires (72-75) en position adjacente aux parties de contact (68-71).

14. Un connecteur selon la revendication 13, caractérisé en ce que les longueurs des parties intermédiaires (72-75) encapsulées à l'intérieur de la branche (82a) varient avec les éléments de bornes (64-67).

15. Un connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque plaquette isolante (82) comprend une branche (82b) qui couvre les parties intermédiaires (72-75) en position adjacente aux sections de bornes (76-79).

16. Un connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que les configurations des plaquettes isolantes (82) sont conçues pour adapter les impédances des éléments de bornes.

17. Un connecteur selon la revendication 16, caractérisé en ce que les plaquettes isolantes (82) comprennent à l'intérieur des ouvertures (82c) grâce auxquelles de l'air est adjacent aux parties intermédiaires de bornes (72b, 73b, 74b, 75b).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102'
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104'
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114
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200
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34
16a
16b
16c
16d
16e

Figure 1

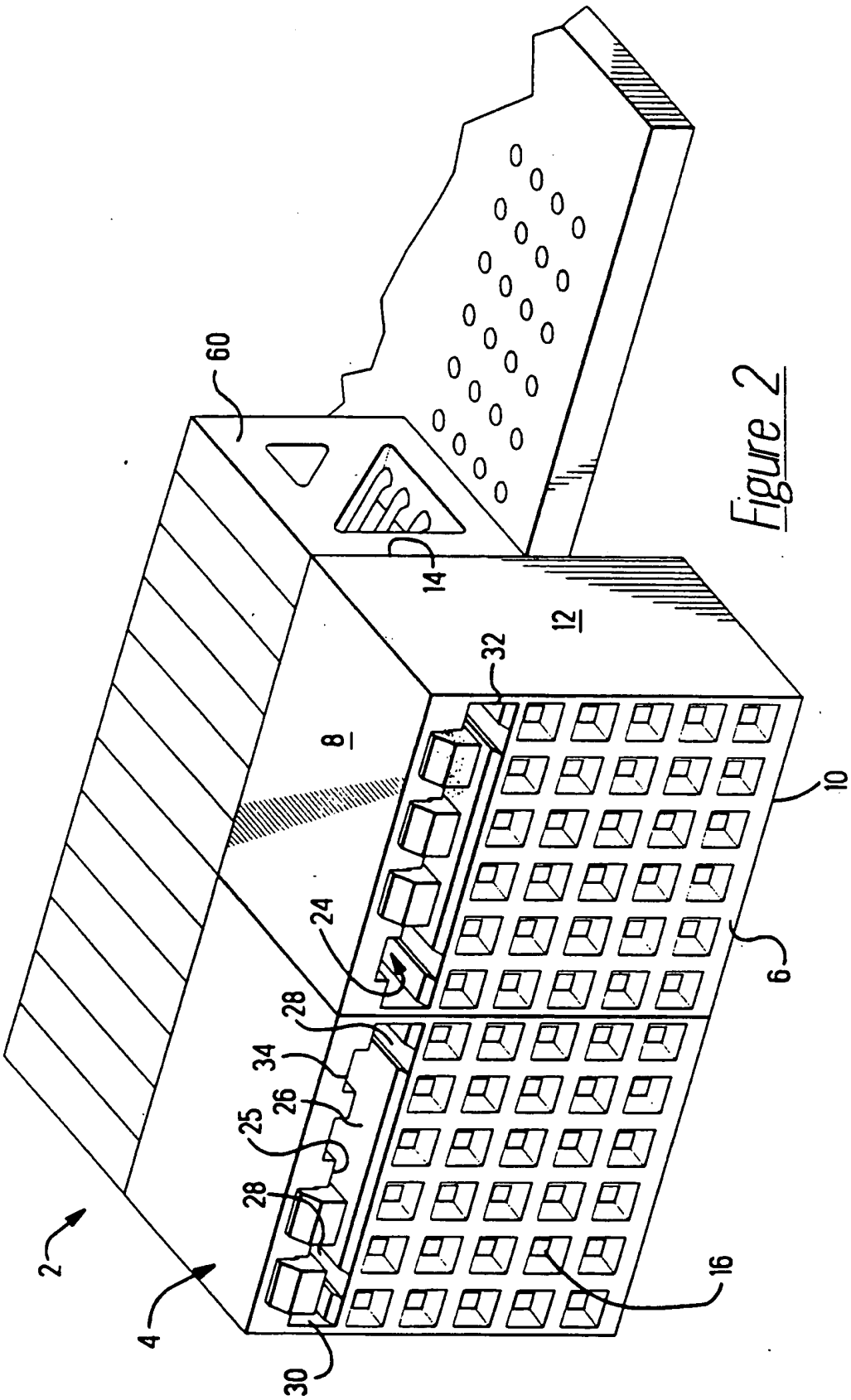
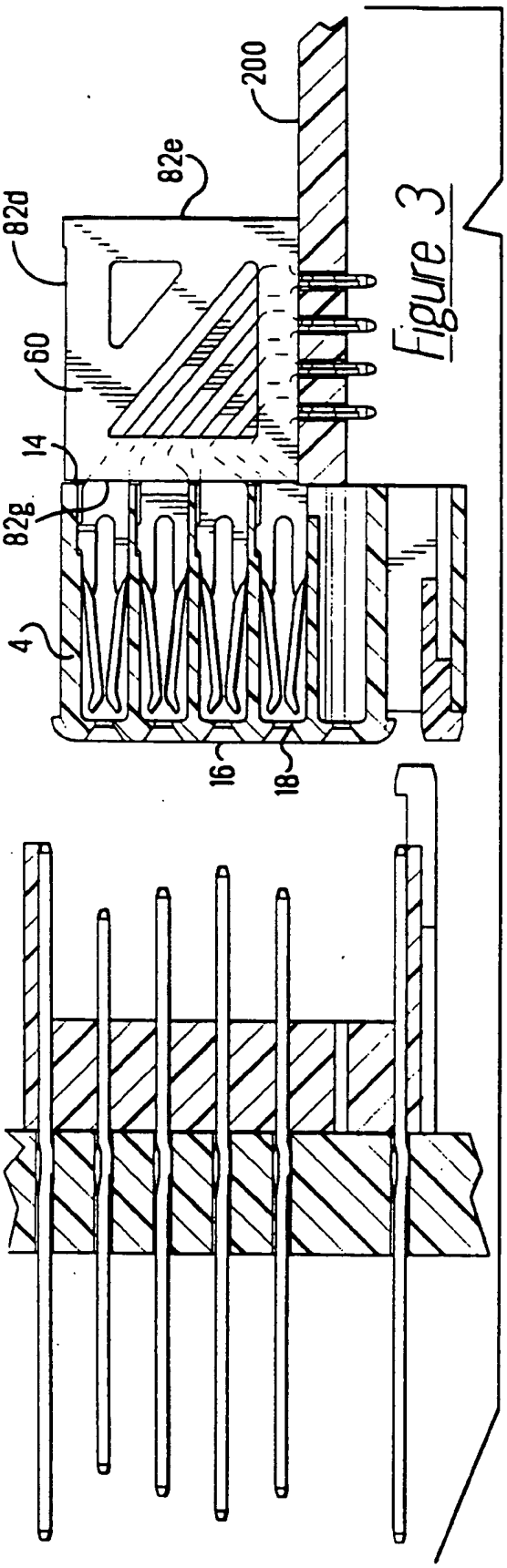


Figure 2



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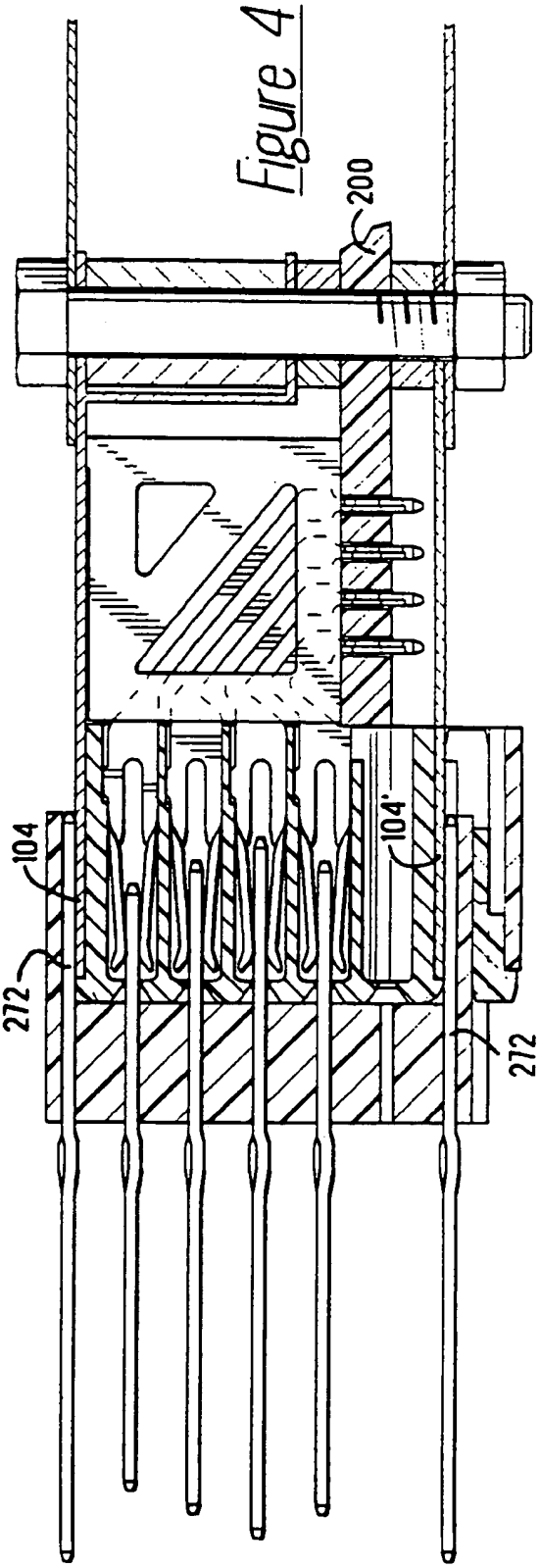

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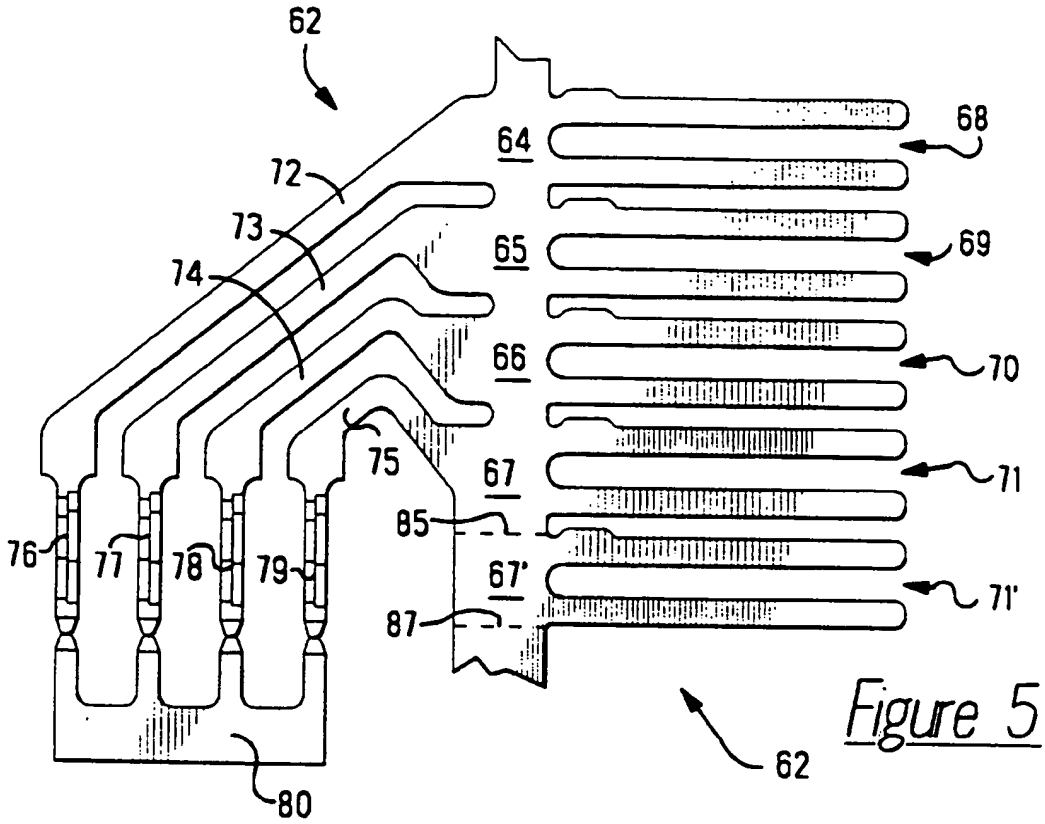


Figure 5

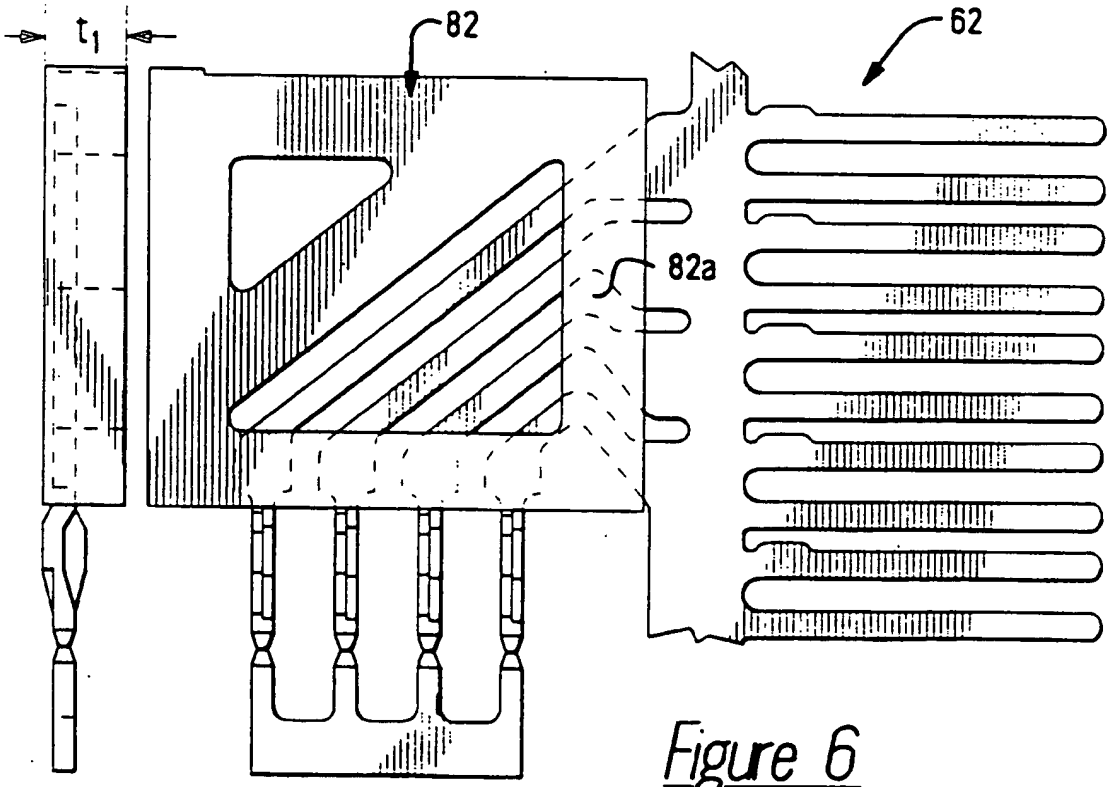


Figure 6

Figure 7

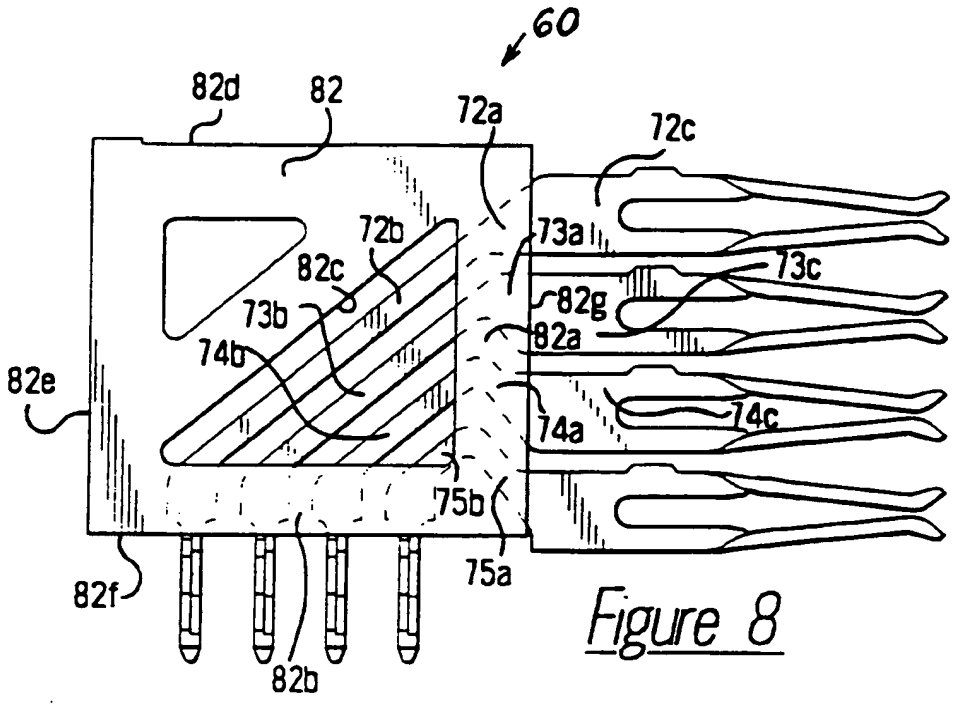


Figure 8

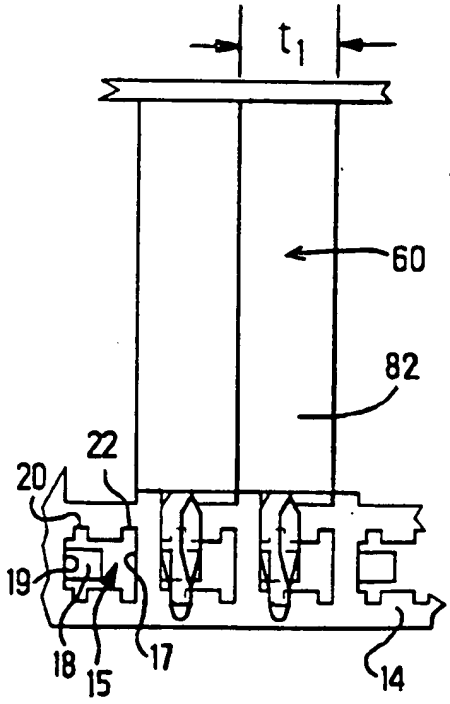
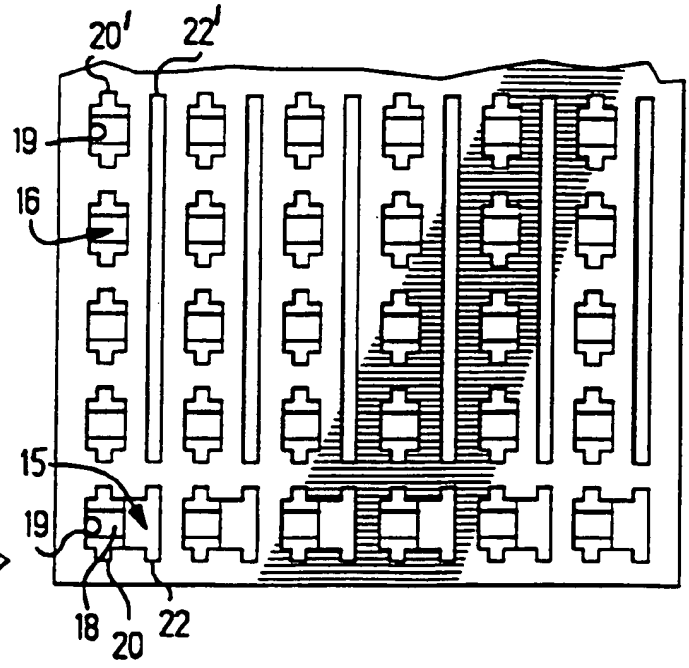


Figure 9A



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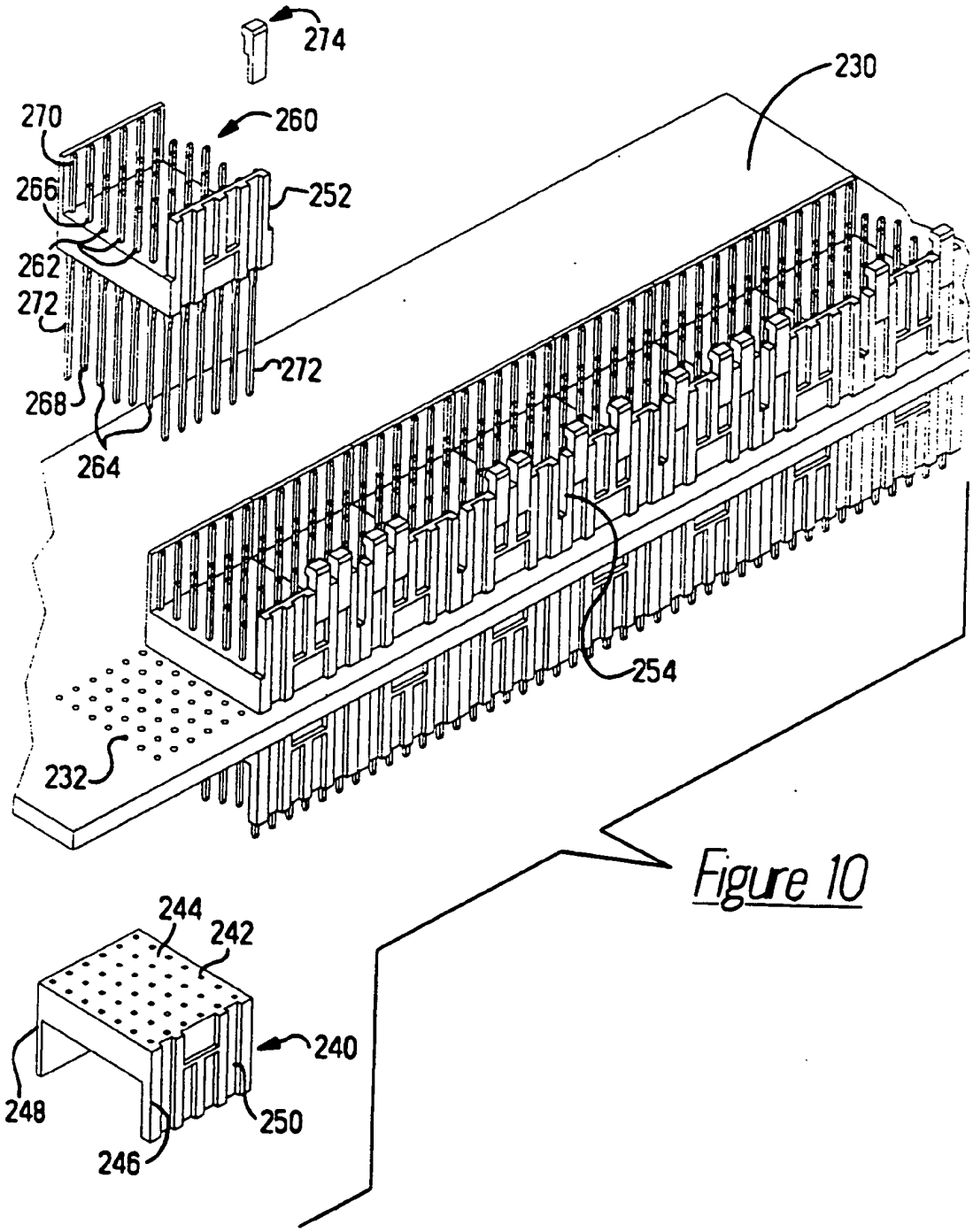
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Figure 10

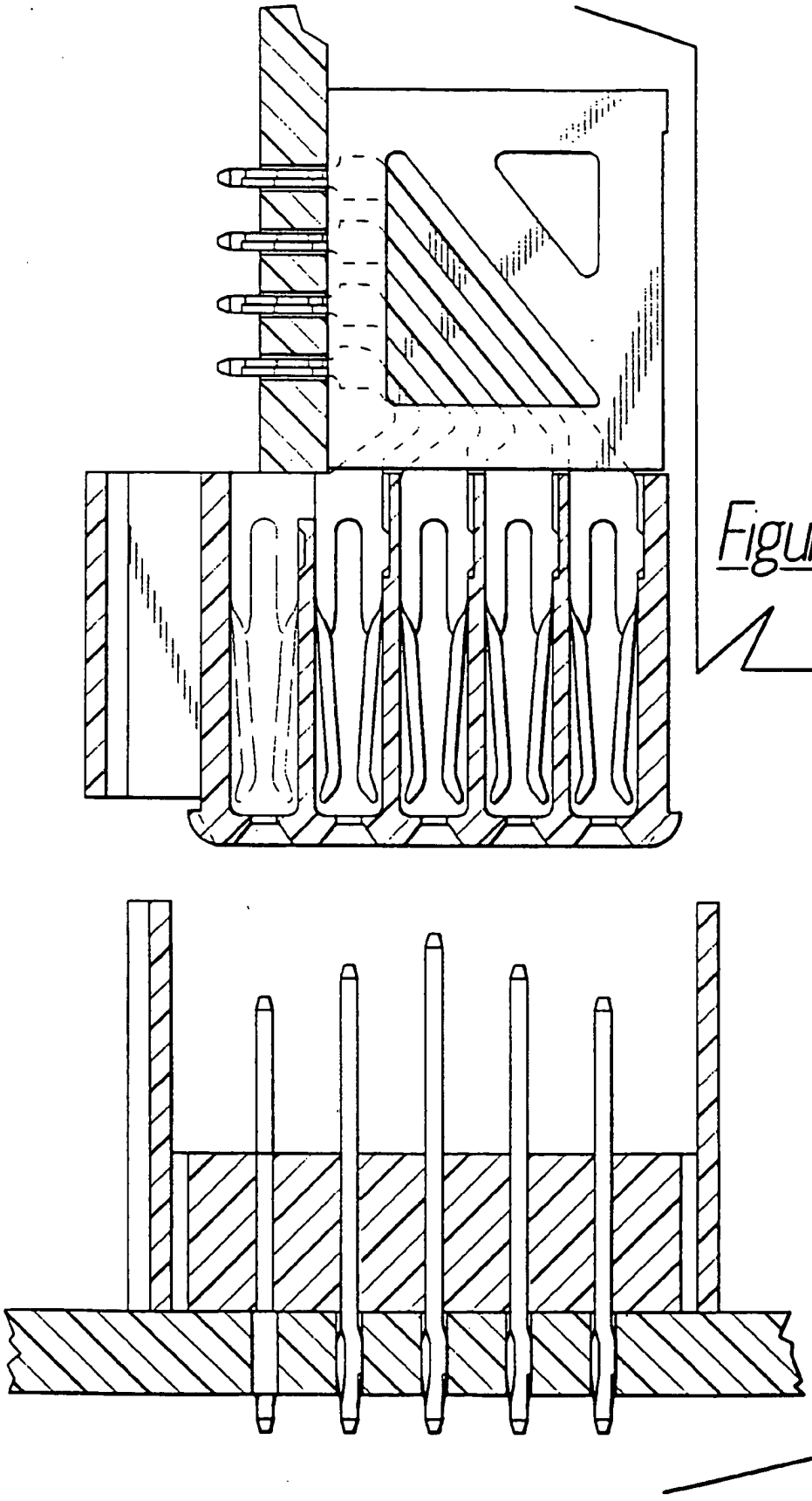
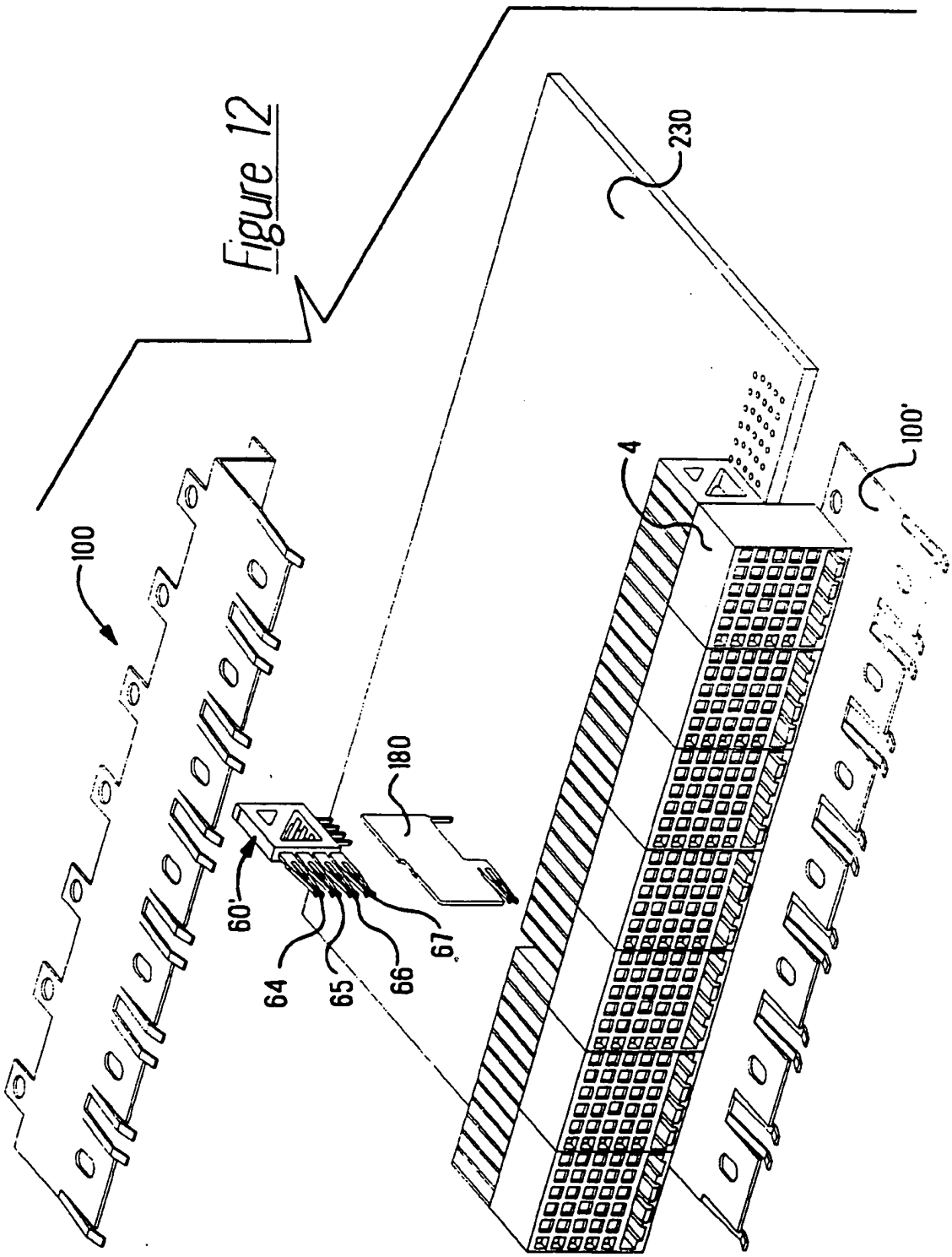


Figure 11

Figure 12



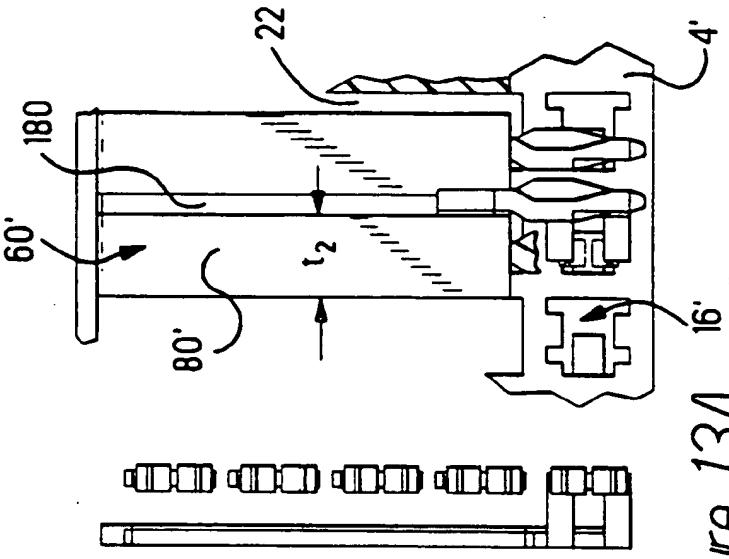


Figure 13A

Figure 13B

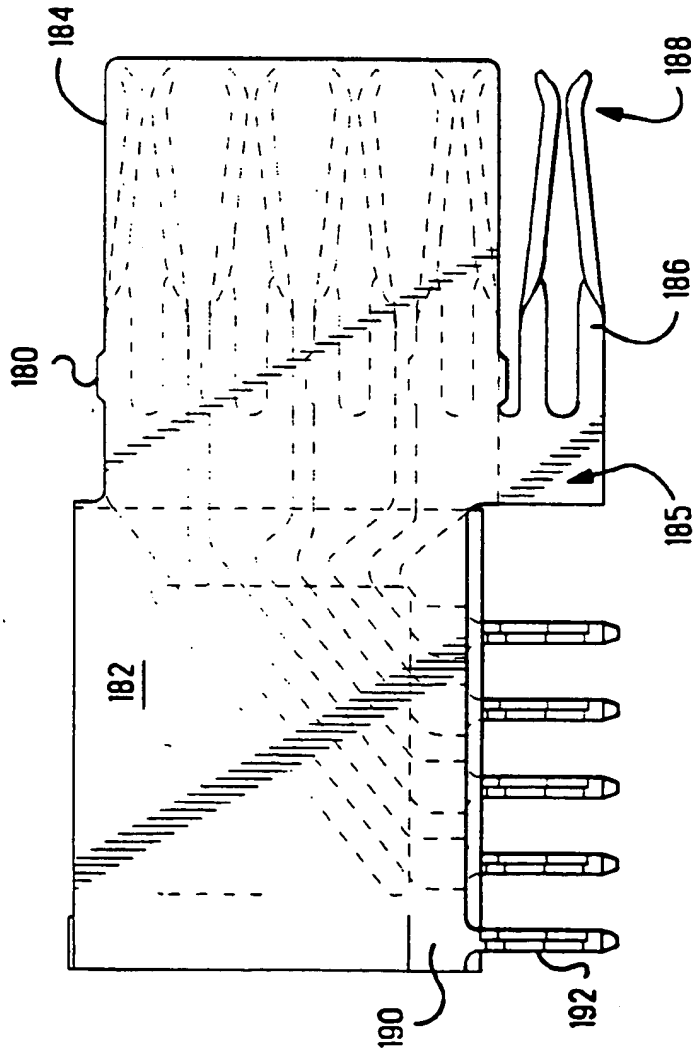


Figure 13

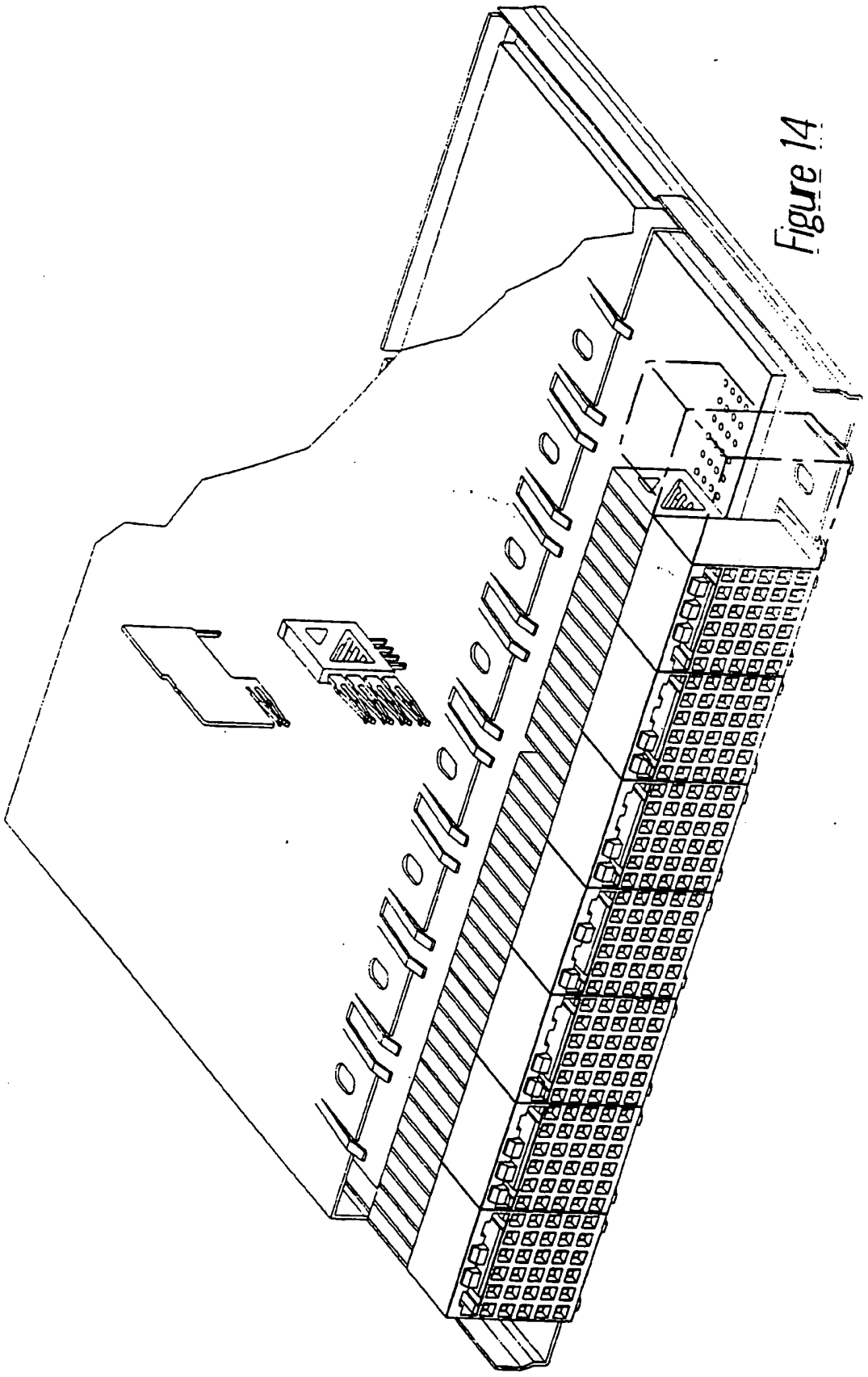


Figure 14

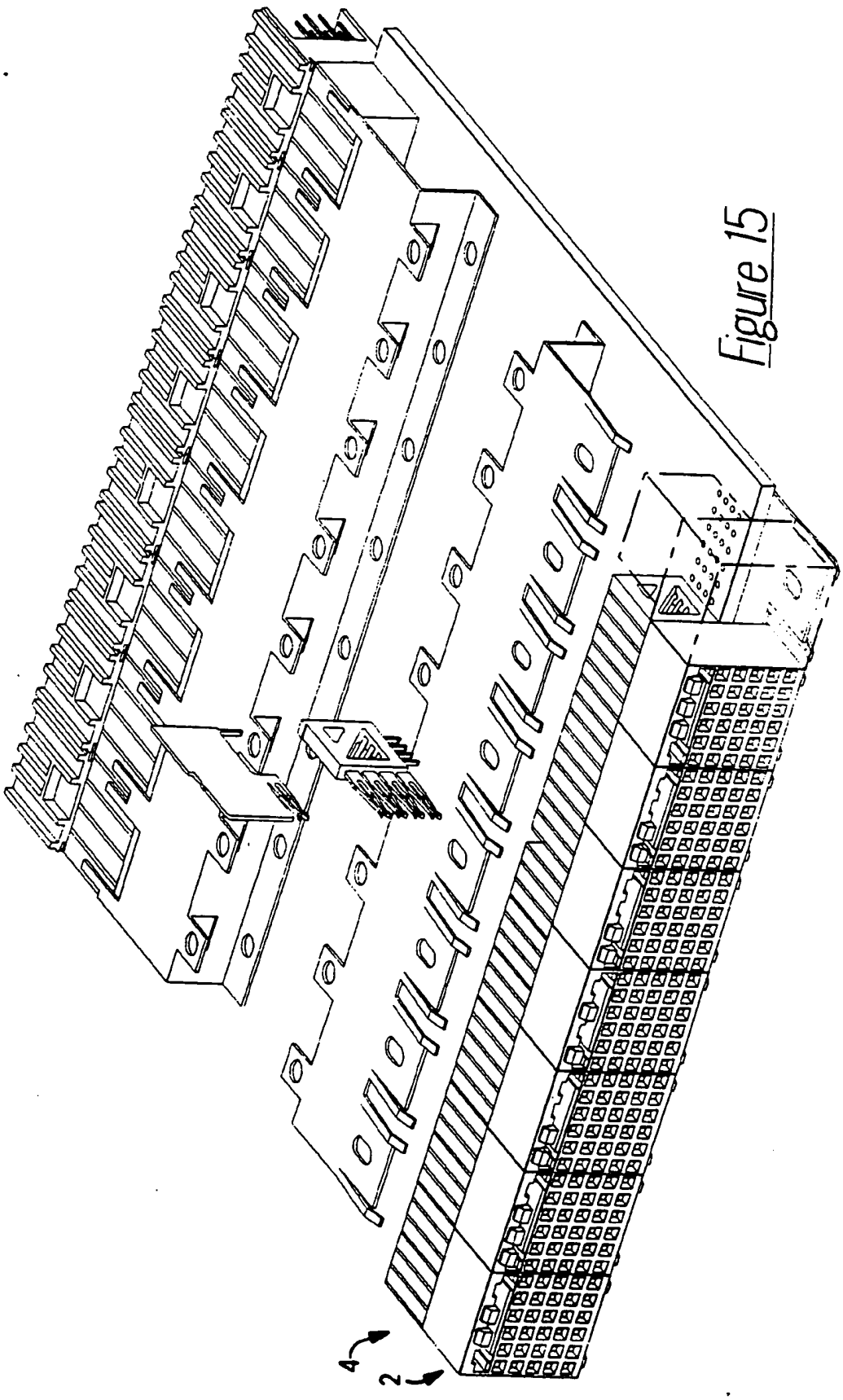


Figure 15

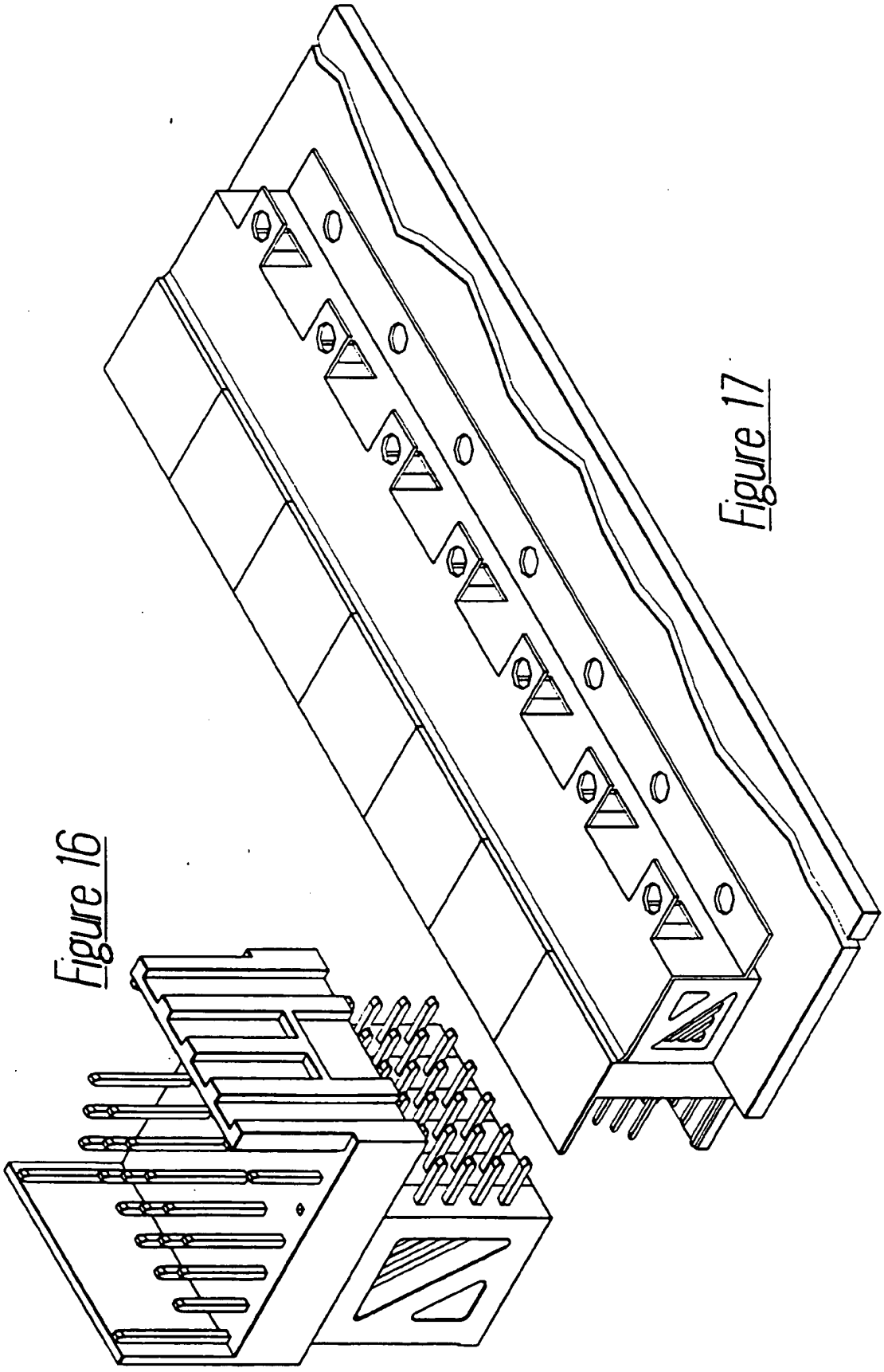


Figure 16

Figure 17